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U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service

Report of the

National Marine Fisheries Service

For the Calendar Year

1972

Seattle, WA
December 1973

U.S. DEPARTMENT OF COMMERCE
Frederick B. Dent, Secretary
National Oceanic and Atmospheric Administration
Robert M. White, Administrator
National Marine Fisheries Service
Robert W. Schoning, Director

Report of the National Marine Fisheries Service For the Calendar Year 1972

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Seattle, WA
December 1973

THE SECRETARY OF COMMERCE
Washington, D.C. 20230

President of the Senate
Speaker of the House of Representatives

Sirs:

I have the honor to transmit herewith the Report of the National Marine Fisheries Service for Calendar Year 1972.

The report describes the structure of the organization, documents the organization's progress toward achieving its goals of fisheries research, utilization and management in the national interest, and lists the publications of its staff during 1972.

Sincerely,

Secretary of Commerce

Enclosure

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INTRODUCTION

This report is submitted in response to the requirement of Section 9(a) of the Fish and Wildlife Act of 1956, as amended 16 U.S.C.742h (a). It covers Calendar Year 1972.

The report which follows will describe the state of the U.S. fisheries, 1972, cover the present organization of the National Marine Fisheries Service, review the significant activities, and list the publications which have resulted from its functions during that period.

STATE OF THE FISHERIES

During 1972, commercial fishery landings at U.S. ports were 4.7 billion pounds, valued at a record $703.6 million at dockside. The quantity was 5 percent lower than in 1971; but because of higher prices at the dock, the value was up 9 percent from a year earlier. The 1972 average price per pound—14.9 cents—was also a record high.

Edible fishery products landed in 1972 amounted to 2.3 billion pounds, down 4 percent from 1971. U.S. landings for non-edible or industrial uses declined 7 percent last year compared with 1971.

Reduced landings in 1972 compared with 1971 occurred principally because of marked declines in landings of menhaden and salmon. There was a 31 percent decrease in 1972 salmon landings, and menhaden landings were down 11 percent. Other species showing significant declines included alewives, Atlantic cod, haddock, Pacific hake, halibut, jack mackerel, whiting, Dungeness crabs and soft clams. The 46.8 million pounds of skipjack landed in 1972 represented a 59 percent decline from 1971, but total tuna landings of 377.6 million pounds at ports in the United States were up 8 percent over a year earlier, because of increased landings of yellowfin tuna. An additional 146.8 million pounds of tuna were landed by U.S. vessels at ports outside the United States, primarily in Puerto Rico.

Species showing significant increases in 1972 were: anchovies, flounders, sea herring, rockfishes, surf clams, king crabs, and snow crabs.

The domestic shrimp industry was again the most valuable fishery in the

United States. The 1972 catch, valued at $193.2 million, accounted for 27 percent of the total U.S. dockside value for all species. U.S. shrimp landings in 1972 were 385 million pounds, down 1 percent from 1971.

The total supply of fishery products improved in 1972 largely because of increased imports. Per capita consumption of edible fishery products was 12.2 pounds, up from 11.4 pounds. The 1972 figure ties a record set in 1927 and includes purchases of edible fish of all types, fresh, frozen, canned, etc. for which statistics are compiled.

Cold storage holdings reached a record high of 419 million pounds at the end of October 1972; and by year end, despite a slight drop, were a record 415 million pounds. Imports of edible fishery products of 2.3 billion pounds (equaling the domestic landings), valued at $1.2 billion, were almost one-fourth greater in quantity and 39 percent higher in value than in 1971 and both were record highs. The value of non-edible fishery imports increased from $187.1 million in 1971 to $261.1 million in 1972, a 40 percent increase. Exports of domestic fishery products were valued at $157.9 million in 1972, up 13 percent.

The 1970 Salt-Water Angling Survey, published by NMFS in April 1973 as *Current Fishery Statistics No. 6200* showed that 9,392,000 U.S. anglers fished in marine waters, an increase of 1,156,000 over 1965. They caught a total of 817 million fish, an 11 percent increase over the 1965 catch of 737 million fish. The estimated weight of the catch rose from 1.47 billion pounds in 1965 to 1.58 billion pounds in 1970, a 7 percent increase. The Salt-Water Angling Survey is made every 5 years. Further details on the NMFS game fish activities can be found later in this annual report.

ADMINISTRATION

Organization

The major aspects of the present organization are these:

1) The primary functions of NMFS have been assigned among three areas, those concerned with Resource Research, Resource Utilization, and Resource Management. Each is headed by an Associate Director.
2) There has been created a small number of fishery research Centers by combining the administrative and program functions of similar biological laboratories.
3) The Centers concerned more with oceanic programs, national in nature, report to the Associate Director for Resource Research rather than to a Regional Director.
4) Centers and Laboratories concerned chiefly with inshore programs, local in nature, report to the Regional Director concerned.

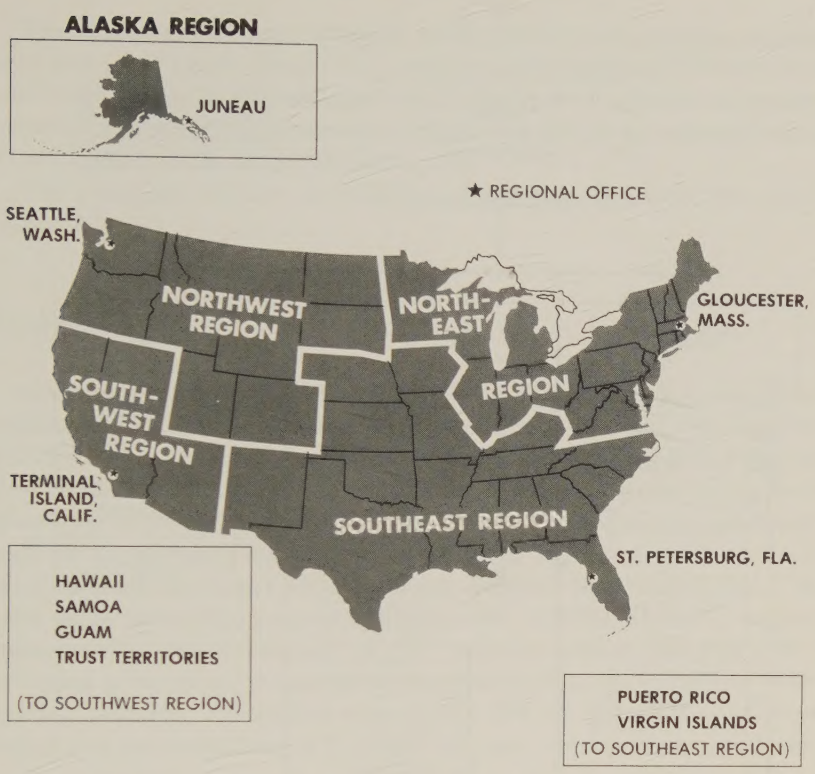

Figure 1.—Regions of the National Marine Fisheries Service.

5) Integrated into this system are the marine game fish laboratories, which came to NMFS from the Bureau of Sport Fisheries and Wildlife when NOAA was established.
6) The fishery products technological laboratories have been placed under the Associate Director for Resource Utilization.
7) Finally, the basic regional structure, with the Regional Directors continuing as the key NMFS representatives in their geographical areas of responsibility, has been retained. The Directors of Centers who report administratively to the Central Office also serve as senior scientific advisors to the Regional Directors.

The principal elements of the system are outlined in Figures 1 and 2.

There are four major fisheries research Centers concerned primarily with high seas research carried out as part of nationwide programs designed to solve problems of national or international nature. The lead laboratories of these Centers are located in Seattle, Wash.; LaJolla, Calif.; Miami, Fla.; and Woods Hole, Mass. These Centers, and the Atlantic Estuarine Fisheries Center at Beaufort, N.C., report to the Associate Director for Resource Research.

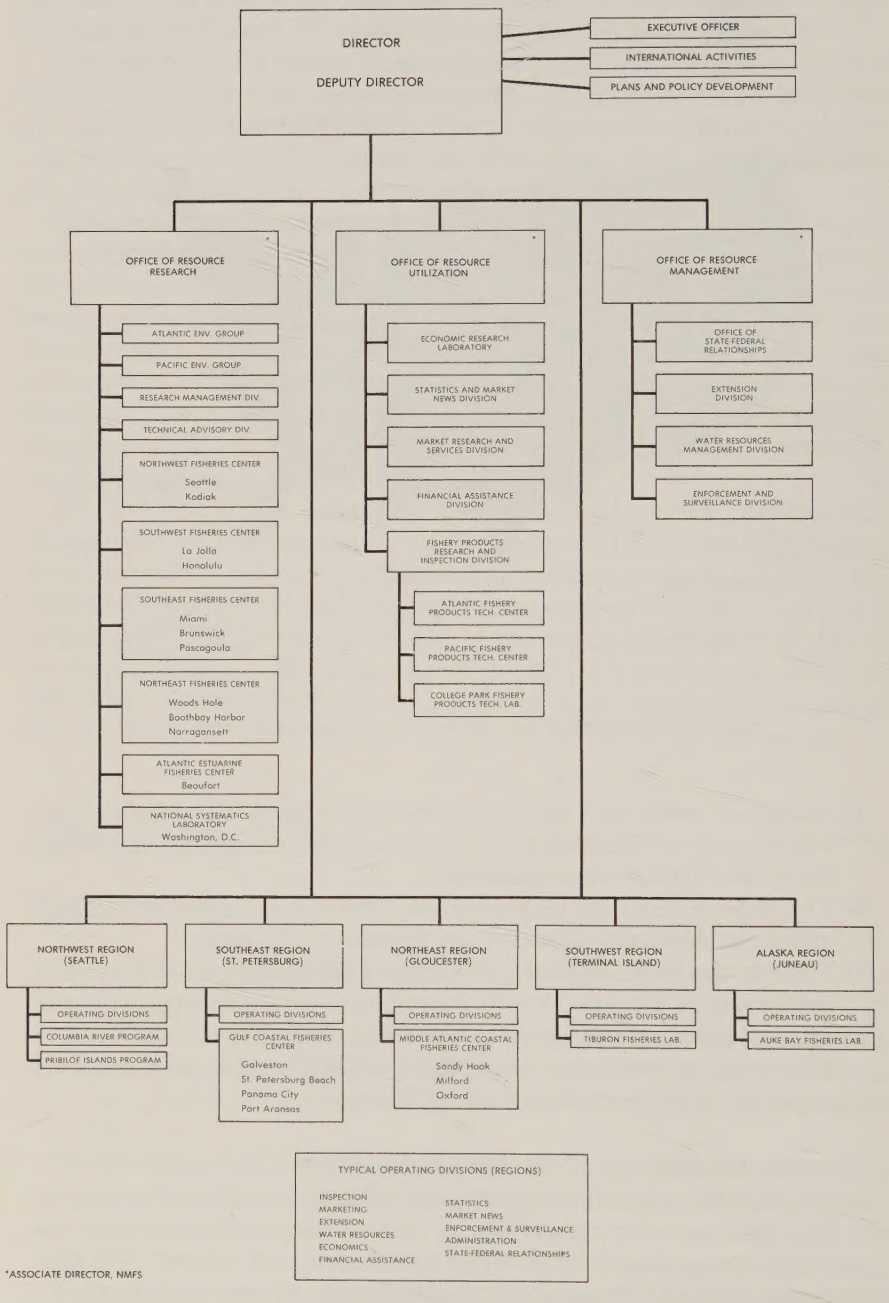

Figure 2.—Organization structure of the National Marine Fisheries Service.

Two Centers, with headquarters in the NMFS laboratories in Galveston, Tex., and Sandy Hook, N.J., and two laboratories, at Tiburon, Calif., and Auke Bay, Alaska, are concerned chiefly with inshore and estuarine research and with programs and problems that tend to be regional in nature. These report to the Regional Directors.

The principal officials of NMFS on December 31, 1972, are shown in Table 1.

Budget

Appropriations for fiscal year 1973, covering those budget activities for which NMFS has program responsibilities, provided an increase of $10,828,000. This was the same as the amount of increase requested in the President's budget. However, as a result of the necessity to reduce Federal spending in order to reduce inflation and avoid a tax increase, as well as to provide increased funding for higher priority programs, most of these increases were deferred. Further reductions of $1,774,000 were made in ongoing programs. The amount of $500,000 was provided for conservation and restoration of the Atlantic salmon and $700,000 was provided to carry out the additional responsibilities in connection with the Marine Mammal Protection Act of 1972 (PL 92-522). These actions resulted in a net reduction of $574,000 and are summarized as follows:

	(Dollars in Thousands)		
FY 1973 Increase Items Deferred	*Increase Appropriated*	*Amount Deferred*	*Balances*
1. Equipment and staff for data collection and processing for the operational phase of the Marine Resources Monitoring, Assessment and Prediction (MARMAP) Program	838	838	— —
2. Develop, test and evaluate equipment for MARMAP surveys	1,312	1,312	— —
3. Expand fisheries research ship operations and maintenance	1,672	1,672	— —
4. Repair Woods Hole Biological Laboratory	100	100	— —
5. Start planning water pollution abatement facilities at hatcheries, on fisheries vessels, and at Alaskan field stations	3,800	3,800	— —
6. Coordinate and review environmental impact statements	354	354	— —
7. Initiate requirements for an aquaculture system	250	250	— —
8. Strengthen state-federal fisheries management program	1,009	1,009	— —

Table 1.—Principal Officials of the National Marine Fisheries Service, December 31, 1972.

Director	Philip M. Roedel
Deputy Director	Robert W. Schoning
Assistant to the Director for Sport Fisheries	John S. Gottschalk
Assistant to the Director for Special Projects	Dr. Steven E. Schanes
Special Assistant to the Director	John L. Baxter
Marine Fisheries Review	Edward F. Edelsberg
Scientific Publications Staff	Thomas A. Manar
Executive Officer	Robert K. Crowell
Chief, International Activities Staff	Robert C. Wilson
Chief, Plans and Policy Development Staff	Kenneth R. Goodwin
Associate Director for Resource Research	Dr. William F. Royce
Deputy Associate Director	Vacant
Director, Northwest Fisheries Center	Dr. Dayton L. Alverson
Director, Southeast Fisheries Center	H.R. Bullis, Jr.
Director, Northeast Fisheries Center	Dr. Robert L. Edwards
Director, Southwest Fisheries Center	Dr. Brian J. Rothschild
Director, Atlantic Estuarine Fisheries Center	Dr. Theodore R. Rice
Director, National Systematics Laboratory	Dr. Daniel M. Cohen
Chief, Technical Advisory Division	Dr. Joseph W. Angelovic
Chief, Research Management Division	Dr. Robert R. Kifer
Associate Director for Resource Utilization	Joseph W. Slavin
Deputy Associate Director	Dr. H.M. Hutchings (Acting)
Director, Economic Research Laboratory	Dr. Frederick W. Bell
Chief, Statistics and Market News Division	Dr. Hoyt A. Wheeland
Chief, Market Research and Services Division	Morton M. Miller
Chief, Financial Assistance Division	James F. Murdock
Chief, Fishery Products Research and Inspection Division	Roland A. Finch
Director, Pacific Fishery Products Technology Center	Dr. Maynard A. Steinberg
Director, Atlantic Fishery Products Technology Center	Louis J. Ronsivalli
Director, College Park Fishery Products Technology Laboratory	Dr. George M. Knobl, Jr.
Associate Director for Resource Management	Dr. Robert F. Hutton

Deputy Associate Director	Walter Kirkness
Chief, Office of State-Federal Relationships	Richard H. Schaefer
Chief, Extension Division	J. David Almand
Chief, Water Resources Management Division	H. William Newman
Chief, Enforcement and Surveillance Division	Raymond L. Fritz
Director, Northwest Region	Donald R. Johnson
Deputy Director	John B. Glude
Director, Columbia River Fisheries Development Program	Fred C. Cleaver
Director, Pribilof Islands Program	William L. Peck
Director, Southeast Region	Jack W. Gehringer
Deputy Director	Harold B. Allen
Director, Gulf Coastal Fisheries Center	Dr. A.K. Sparks
Director, Northeast Region	Russell T. Norris
Deputy Director	William G. Gordon
Director, Middle Atlantic Coastal Fisheries Center	Dr. C.J. Sindermann
Director, Southwest Region	Gerald V. Howard
Deputy Director	Floyd S. Anders, Jr.
Director, Tiburon Fisheries Laboratory	Richard S. Shomura
Director, Alaska Region	Harry L. Rietze
Deputy Director	Robert W. McVey
Director, Auke Bay Fisheries Laboratory	Dr. William A. Smoker
Public Affairs Officer*	John A. Guinan
Legislative Advisor*	Kip Robinson
Staff Attorney*	Herbert L. Blatt

*NOAA personnel on Detached Service with NMFS

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9. Expand enforcement and surveillance program related to monitoring of foreign fishing activities in international waters adjacent to the United States	348	348	— —
10. Expand technical information-extension services to fishermen	100	100	— —
11. Initiate market research on consumer consumption patterns	326	326	— —
12. Expand grant-in-aid for conservation and restoration of the Atlantic salmon	540	40	500
13. Reduced administrative cost for vessel construction subsidy program	146	— —	146

14. Administer new program of tax deferments to facilitate replacement of fishing vessels	225	79	146
15. Pribilof Islands Operations	100	100	——
Total	+10,828	−10,328	+500

FY 1973 Ongoing Program Reductions

1. Reduction in biological research on commercial and recreational fish species by tying up four research vessels, the *George B. Kelez, Charles H. Gilbert, Townsend Cromwell,* and the *Delaware II,* and closing three laboratories, those at Brunswick, Georgia; St. Petersburg, Florida; and Boothbay Harbor, Maine ..... —$ 345

2. Phase-out of fish protein concentrate research and discontinuation of demonstration plant operation ..... −$1,300

3. Termination of assistance to the States in controlling and eliminating jellyfish, as provided for under the Jellyfish Act of 1966 (PL 89-720), as amended ..... −$ 29

4. Reduction in Pribilof Islands Operations ..... −$ 100

Total reductions −$1,774

New Programs Funded in FY 1973

Marine Mammal Conservation and Protection ..... +$ 700

Total Net Change −$ 574

Recap of Net Reduction

FY 1973 Increase Items Deferred - Net Balance ..... +$ 500

FY 1973 Ongoing Program Reductions - Total ..... −$1,774

New Programs funded in FY 1973 +$ 700

Net Reduction −$ 574

Comparative Summary

Activity	*Adjusted FY 1972*	*Change*	*Adjusted FY 1973*
	(In Thousands of Dollars)		
Resources Research & Assessment	$24,285	+$355	$24,640

This budget subactivity includes the marine monitoring and assessment program (MARMAP) to determine and predict the abundance and distribution of living marine resources and research to develop the necessary technology. It also includes biological and ecological investigations to develop an in depth understanding of living marine resources, their environment, and the interrelationships. Ship support is included under biological investigations. Data produced by resources research and assessment programs are necessary for proper management and utilization of marine resources. The change of $355,000 includes an increase of $700,000 for carrying out responsibilities under the Marine Mammals Protection Act of 1972 (PL 92-522) to conserve and protect whales, porpoises, seals, and sea lions. These responsibilities and duties include: overall program operation and administration; establishment of regulations; conduct of hearings; etc.

A decrease of $345,000 covers the tying up of four research vessels and the closing of three laboratories.

Resource Management and Development	$26,791	−$929	$25,862

This budget subactivity covers: formulation and implementation of management policy, including acquisition of data concerning foreign fishing, and related enforcement and surveillance functions; grant-in-aid to States, on a cost sharing basis, to assist in management and development of fishery resources and related research; analyses and recommendations concerning the effect of proposed environmental changes; research on the feasibility of aquaculture for selected species, including related technology; restoration of anadromous fisheries, primarily salmon in the Columbia River, including the operation of hatcheries, fishways, and screens, and the development of methods and technology to improve survival of fish during migration between ocean and spawning areas; extension services, statistical, marketing, and economic services; research on harvesting methods and technology; the development of technology and methods which will permit safer and greater utilization of fishery resources; and Pribilof Islands operations, including fur seal research and management under the terms of the international Interim Convention on the Conservation of North Pacific Fur Seals and the Fur Seal Act of 1966. Program increases for FY 1973 included $500,000 for conservation and restoration of the Atlantic salmon in cooperation with the State of New Hampshire under PL 89-304. Program reductions of $1,429,000 include a phase out of fish protein concentrate demonstration plant operations of $1,300,000; termination of the Jellyfish Control Program assistance to States under PL 89-720 of $29,000; and a cutback of $100,000 in the Pribilof Islands Program.

Fisheries Financial Support Services	$373	—	$373

These funds provide for management support for the Mortgage Insurance Program authorized by Title XI of the Merchant Marine Act, 1936, as amended by the Federal Ship Financing Act of 1972; the Vessel Construction Subsidy Program; and the new Capital Construction Fund Program. Appropriations for the Fishermen's Protection Fund, together with fees collected from vessel owners, provide for payment to vessel owners and crews to compensate for certain financial losses sustained as a result of fishing vessels being seized by foreign countries.

The amount for 1973 includes an increase of $146,000 to administer the Capital Construction Fund Program. This increase is offset by the reduction in the cost of administering the Vessel Construction Subsidy Program.

NMFS Totals*	$51,449	−$574	$50,875

*These amounts do not include the Fisheries Loan Fund, which is financed from repayments of loans and interest payments; and administration of the Fishermen's Protection (Guaranty) Fund, which is financed from fees paid for participation in the program. It does not include the cost of administration and services provided by the National Oceanic and Atmospheric Administration, and does not include the total budgetary resources available to the National Marine Fisheries Service from reimbursements and trust funds.

Vessel Activities

The NMFS and other components of NOAA commenced the process of transferring their large vessels into a consolidated NOAA fleet operation. The NOAA fleet is to be operated by the newly formed Office of Fleet Operations (OFO) under the National Ocean Survey (NOS). The "new"

TABLE 2.—Vessels in the fisheries research fleet.

VESSEL	LENGTH (ft.)	DRAFT (ft.)	DISP. (L.T.)	CR. SPEED (kts.)	RANGE (naut. mi.)	ACCOMMODATIONS	CREW (F.T.P.)	YEAR DELIVERED	HOME PORT	GENERAL AREA OF OPERATIONS	USE (Program Emphasis)
1. Albatross IV	187	14	1060	11.0	9000	32	17	1962	Woods Hole, Mass.	NW Atlantic	Groundfish Assessment
2. George M. Bowers	73	8	91	10.0	1200	10	2	1956	Brunswick, Ga.	SE U.S. Coast (inshore)	Invertebrate Assessment & Tech.
3. John N. Cobb	93	9	250	9.0	4800	13	7	1950	Seattle, Wash.	NE Pacific	Groundfish Assessment & Tech.
4. Townsend Cromwell	159	10	652	12.0	12000	25	15	1963	Honolulu, Hawaii	Central Pacific	Resource Assessment
5. Delaware II	155	11	680	12.0	8000	21	8	1968	Sandy Hook, N.J.	NW Atlantic	Inshore and Offshore Ecology
6. Miller Freeman	215	16	1782	14.5	16000	37	1	1967	Seattle, Wash.	Inactive	Storage
7. Charles H. Gilbert	123	9	383	9.0	9500	16 (use alt. crew)	0	1952	Honolulu, Hawaii	Central Pacific	Pelagic fisheries
8. David Starr Jordan	171	11	890	11.0	9000	33	17	1965	San Diego, Calif.	Eastern Central Pacific	Resource Assessment
9. George B. Kelez	177	12	936	10.5	7300	20	15	1944	Seattle, Wash.	NE Pacific	Salmon Assessment & Oceanography
10. Murre II	86	7.5	295	8.0	7000	9	2	1943	Auke Bay, Alaska	Alaska (inshore)	Inshore Ecology
11. Oregon	100	10	400	9.0	4800	19	7	1946	Kodiak, Alaska	Alaska (offshore)	Groundfish Assessment
12. Oregon II	170	13	906	13.0	10700	25	15	1967	Pascagoula, Miss.	Gulf of Mex., Caribbean SE U.S. Coast (offshore)	Resource Assessment & Oceanography
13. Pribilof	222	16	1893	11.0	8400	20	15	1953	Seattle, Wash.	Seattle to Pribilof Is.	Freight Cargo Carrier

fleet includes all vessels over 65 feet in length; the smaller NMFS vessels will continue to be operated under NMFS.

The consolidation process has been planned in phases to provide a nondisruptive transition. On July 1, 1972, four NMFS vessels (operating in the northeast Pacific) were transferred to NOS and operations were begun under the Pacific Marine Center of OFO located in Seattle, Washington. These vessels were: the *John N. Cobb, Miller Freeman, George B. Kelez,* and *Oregon*. The remaining vessels are to be transferred at subsequent dates.

Funding cutbacks in NMFS near the end of the calendar year caused marked changes in the operational status of some of the vessels. Plans were made to remove the *George B. Kelez* from active service and to dispose of this vessel along with the *Charles H. Gilbert*. Preliminary work being performed on the *Miller Freeman,* preparatory to putting her into active service, was discontinued and reactivation plans deferred. Plans were made to deactivate the *Townsend Cromwell* and the *Delaware II;* these actions are to become effective as soon as possible in 1973. Program adjustments to accommodate reduced funding and less availability of vessel sea time have been made. However, during 1972 the vessels operated as scheduled without excessive curtailment.

Table 2 shows vessels in the fisheries research fleet.

Marine Game Fish Activities

As the numbers of marine sport fishermen increase, it becomes apparent that the productive capacity of the resource is being placed under increasing stress. Additionally, manmade environmental changes continue to pose grave threats as the demand grows.

The increase in fishing effort will continue its upward spiral as recreationists gain greater affluence and more leisure time. More and more Americans are turning to the saltwater sport fishing resource for recreation, relaxation, and adventure and their numbers are not likely to decrease in the foreseeable future.

In order to meet the needs of tomorrow, the status of the stocks of sport and commercial fish species must be determined and continually monitored to determine the effects of environmental changes and fishermen pressure.

Obviously, a highly specialized program involving only marine game fish would be contrary to the direction inherent in the formation of NOAA. Therefore, the development of activities which could take full advantage of NOAA's vast overall capabilities yet remain responsive to the needs of the sport fish resource had to be identified and implemented.

Along with NOAA/NMFS, the coastal States play an important role in areas related to research and management of the sportfish resource, the

collection of data, and the development and implementation of short- and long-term plans and programs.

Recognizing the fact that marine gamefish activities have been somewhat limited for a variety of reasons, NOAA/NMFS has nonetheless made strides in important areas.

GAME FISH-ASSOCIATED RESEARCH ACTIVITIES

Northeast Fisheries Center:–Continuation of the study of shark distribution in the Atlantic Ocean, participation in cooperative high-seas tagging of Atlantic salmon, and support of the international game fish tagging program headquartered at the Woods Hole Oceanographic Institution.

Middle Atlantic Coastal Fisheries Center:–Fish behavior studies of bluefish, mackerel, flounder, and tautog, completion of an anglers' guide to fishing locations and angler facilities from Maine to Key West, studies of fish diseases, and the impact of the "red tide" and environmental deterioration in the New York Bight.

Atlantic Estuarine Fisheries Center:–The artificial reefs program monitors previously constructed reefs, and evaluates the extent that reefs serve as fish concentrators. A creel census has been conducted in cooperation with party boats operating out of Beaufort and Morehead City, N. C., and estuary studies have been expanded to provide additional information on the significance of estuarine areas as nursery grounds for various species of fish including principal game fishes of the region.

Southeast Fisheries Center:-One project deals with the determination of the extent to which data from fishing tournaments can contribute to our understanding of the life history, distribution, and populations of the principal game fish sought in these tournaments. Midwater fish attractors are being tested and developed at the Pascagoula Laboratory. A cooperative project with the University of Florida, NASA, and sport fishermen is attempting to determine the location of principal big game fish in relation to ocean currents of St. Petersburg.

Gulf Coastal Fisheries Center:–Initial surveys of existing fish stocks in the ecosystems of St. Andrews and Choctawhatchee Bays and nearshore areas to provide the groundwork for studies of the population dynamics, distribution and life histories of those species of fish occupying strategic positions in the estuarine and nearshore areas.

Northwest Fisheries Center:–The saltwater rearing project in Puget Sound includes the development of non-migratory strains of salmon for stocking in Puget Sound for eventual capture by sport fishermen. A cooperative

survey of sockeye salmon migration patterns through Lake Washington was of direct benefit to the local sport fishermen and will be repeated as funds allow.

Tiburon Fisheries Laboratory:–A new version of an anglers' guide to the fishes of the Pacific coast is in preparation and a project involving a study of the extent of sport fishing and the characteristics of fish stocks has been initiated in the coastal waters of central California.

Southwest Fisheries Center:–The Pacific Game Fish Tagging Program, which is identified primarily with Baja California and the main coast of Mexico, is the primary game fish project at this Center.

Anadromous Fish Program–Columbia River:–The Columbia River Fishery Development Program was initiated in 1949 in an effort to offset damage to salmon and steelhead resources from extensive Federal water development projects. In addition to environmental rehabilitation work, fishway construction and fish protection devices, a total of 21 salmonid hatcheries are in operation on the Columbia River and its tributaries.

This program has proved the salvation of the Columbia River salmon runs. Of special significance is the run of coho salmon, which has increased dramatically in the past decade. A cost/benefit ratio of $3 returned for each $1 spent is assigned to the coho rearing program.

In 1971, the most current year of catch records, the Oregon Game Commission has estimated that slightly over 300,000 coho salmon were caught by sportsmen in the Columbia River and coastal offshore area. Tagging studies by NMFS have indicated that at least half of these fish were produced in program hatcheries. If we use a conservative value of $20 per fish to the sportsmen, these 150,000 salmon are valued at $3 million. Added to this value are the sport-caught chinook salmon and steelhead trout, plus commercial landings.

SPORT FISH STATISTICS ACTIVITIES

Significant steps were taken to improve the accuracy of marine sport fish statistics collected by the Bureau of the Census' 5-year salt-water angling surveys. Under contract a professional survey firm made a study to: (1) determine the causes of error in household surveys; (2) recommend methods for obtaining improved results from household interviews; (3) recommend methods to correct for remaining error; and (4) test these recommendations in a pilot household survey. The study showed that a respondent should not be required to recall more than two months, that bias can be reduced by using calendars, appropriate questionnaire phraseology and design and methods to minimize species identification

problems. The pilot household survey resulted in substantial improvement over the Census' 1-year recall Salt-Water Angling Survey.

Because of the importance of determining what kinds of data are needed by various interest groups, a contract was arranged with a private firm to develop a priority listing of data needs. The contractor prepared alternative 5-year program development plans for collecting statistics to meet as many of the sport fish statistical needs as possible at various funding levels.

Also in FY 1973, work was completed on the 1970 Salt-Water Angling Survey. In addition, work was started on a compendium of marine sport fish data collected by other Federal agencies, the States, and private organizations.

ECONOMIC RESEARCH ACTIVITIES

The initial program consisted of a contract study designed to canvass the current economics research field to determine the "state of the art" of evaluation of outdoor recreational pursuits, to examine the valuation proposed in guidelines of the Water Resources Council, and to prepare a priority listing of research needed as a foundation for an in-depth economics program.

EXTENSION ACTIVITIES

The Extension Program carries out the same types of activities for the benefit of the marine angler constituency that it does for the other NOAA constituencies. Meetings were organized to inform sport fishermen of current problems and programs, and to provide information to facilitate angling and promote safety. A series of leaflets is under preparation, and a special project describing the characteristics of sport fishing in Alaska has been funded.

International Activities Staff

The International Activities Staff conducts investigations of the fishing operations carried on by foreign countries which have an impact on the United States fishing industry and on achievement of NMFS program objectives. Current fishery reports covering political, economic, and technological developments in 15 countries were issued. An appraisal was also made of the fisheries policies of the European Economic Community. A resume of the foreign fishing vessels operating off the United States coasts was compiled monthly for the information of interested government and industry officials. Reports on opportunities for fisheries development and investment in 30 countries were obtained from U.S. Foreign Service posts

and published for the information of U.S. firms who sought supplies of shrimp and lobsters, which were in short supply in the United States.

In addition, the Staff provided guidance and instructions to the Regional Fisheries Attachés stationed in Tokyo, Copenhagen, Mexico City, and Abidjan in conducting special surveys. They included, among others, a detailed study on the shrimp industry of Latin America; survey of the fisheries of Southeast Asia and the Trust Territory of the Pacific Islands; and a market to promote the sale abroad of U.S. fishery products of which there is little demand in the United States.

The translation program provides industry, Government, and academic circles with fishery and oceanography translations. The program acts as a clearinghouse for translations in these fields. The translations are financed primarily with P.L. 83-480 special foreign currencies and are done in India, Israel, Poland, Yugoslavia, and Tunisia. Interested parties are being kept informed of translated literature through two monthly releases, *Translated Tables of Contents of Current Foreign Fishery and Oceanography Publications* and *Received or Planned Current Fishery and Oceanography Translations*. During 1972, 19,300 pages consisting of 1,320 articles, books, and papers were translated and 26,400 copies distributed.

International Fishery Treaties And Agreements

NMFS continued its objective to implement U.S. international policy by helping to protect both coastal and distant-water fishery resources of interest to U.S. fishermen. The regulatory and management obligations of the Service are presently concerned with implementing regulations to carry out eight treaty obligations of the United States with respect to harvesting: halibut, salmon, and fur seals in the North Pacific; hake, haddock, cod, and flounder in the Northwest Atlantic; yellowfin tuna in the tropical Pacific; and whales generally. Various employees of the Service have been appointed by the President to serve as Commissioners on several of the eight international fishery commissions established for specific fisheries or specific areas of fishing concerning these treaties.

The Service has responsibility for conducting all scientific investigations needed to support U.S. participation in the International Commission for the Northwest Atlantic Fisheries (ICNAF), the International Commission for the Conservation of Atlantic Tuna (ICCAT), the International North Pacific Fisheries Commission (INPFC), and the North Pacific Fur Seal Commission (NPFSC), and the International Whaling Commission (IWC). The United States is also party to 10 bilateral fishery agreements adapted to more specialized management problems. The Service performs research in support of many of these. These bilateral agreements are: 1) U.S.-South Korea Agreement Concerning Cooperation in Fisheries; 2) U.S.-Canada Reciprocal Fishing Agreement; 3) U.S.-Brazil

Agreement on the Conservation of Shrimp; 4) U.S.-U.S.S.R. Contiguous Fishery Zone Agreement; 5) U.S.-U.S.S.R. Agreement on Gear Conflict; 6) U.S.-U.S.S.R. Eastern Bering Sea King and Tanner Crab Agreement; 7) U.S.-Japan Contiguous Fishery Zone Agreement; 8) U.S.-Japan Eastern Bering Sea King and Tanner Crab Agreement; 9) U.S.-Poland Middle Atlantic Fishery Agreement; and 10) U.S.-U.S.S.R. Middle Atlantic Fishery Agreement.

During 1972 the United States renegotiated two bilateral executive agreements with Japan. The U.S.-Japan agreement on the Contiguous Fishery Zone initiated on May 9, 1967, after passage of Public Law 89-658 establishing a 9-mile exclusive fishery zone, was renegotiated in 1970 and amended and extended in December 1972 for a 2-year period. The agreement allows certain traditional Japanese fisheries to continue inside the U.S. exclusive fishery zone during specific periods. It also places certain restructions on Japanese fishing on the high seas outside the fishery zone to prevent gear conflicts and to allow U.S. fisheries the opportunity to fish in areas usually fished by them. The U.S.-Japan agreement on the king and tanner crab fisheries of the eastern Bering Sea initiated on November 25, 1964, was renegotiated in 1970 and amended and extended in December 1972 for a 2-year period. The principal change in 1972 was that the eastern Bering Sea crab fishing grounds were divided into southeast and northwest areas and Japan's quotas on both king and tanner crab were substantially reduced in the southeast area where U.S. fishermen operate. The 1972 agreement also eliminated the use of tanglenets in the crab fishery.

In June 1972 the United States and Poland extended for 1 year their agreement on mid-Atlantic fisheries which was initially signed on June 12, 1969. The agreement prohibits large vessels, such as those used by Poland, from fishing during January 1 through April 15 in a long belt from Rhode Island to Virginia in waters of the 50-100 fathom zone where winter concentrations of bottomfish are found. The agreement also requires Poland to refrain from conducting specialized fisheries in all instances for scup, flounder, red hake, silver hake, menhaden, river herring, and black sea bass in the Mid-Atlantic Bight and to limit its incidental mid-Atlantic catch of those species to a total of 1,300 metric tons, of which not more than one-third may be of any one species.

On April 24, 1972, Canada and the United States extended for 1 year their agreement on reciprocal fishing privileges in the 3-12 mile fishery zone off both the east and west coasts of the two countries south of 63°N latitude. The agreement covers species involving commercial fisheries affecting both countries.

On May 9, 1972, the United States and Brazil signed an agreement on the conservation of shrimp off the northeastern coast of Brazil which will expire on January 1, 1974, unless extended by the parties. The agreement projects the mutual interest of the two governments on the conservation of

shrimp in a defined area which is within but not coinciding with Brazil's claimed territorial sea, and which adequately covers the grounds which are economically important to U.S. shrimp interests. The agreement expresses the common concern of both parties in protection of shrimp stocks in the defined area, pending the acquisition of better information on shrimp resources. The agreement permits up to 325 U.S. vessels to fish for shrimp in the area of the agreement, of which not more than 160 shall be in the area at any one time. Other provisions of the agreement concern the types of vessels and gear permitted, seasonal restrictions, transshipment of catch, the maintenance of logbook records, and other issues relating to the conservation of the resource.

The United States and South Korea entered into a new 5-year fisheries agreement on December 12, 1972, designed to facilitate the rational exploitation of resources in the North Pacific area. The principal feature of this agreement is that South Korea agreed to take measures necessary to insure that nationals and vessels of Korea will refrain from fishing for salmon and halibut in the northeastern Pacific Ocean and Bering Sea east of 175°W longitude. Such binding commitment from South Korea offers substantial new protection for salmon of North American origin and halibut stocks in the northeastern Pacific Ocean and eastern Bering Sea. (Under the abstention provision of the International Convention for the High Seas Fisheries for the North Pacific Ocean, Japan abstains from fishing for salmon and certain stocks of halibut east of 175°W longitude.) Other portions of the agreement deal with measures to prevent conflicts between mobile and fixed gear, measures to avoid pollution of the seas and the exchange of scientific and fisheries information.

Plans And Policy Development Staff

The Plans and Policy Development Staff advises the Director on those activities of the NMFS involving planning, program coordination, and needs of the future in developing missions, goals, objectives, and policies and in so doing provides coordination within NOAA and with other agencies of Government and public and private organizations. It conducts and/or coordinates special analytical studies to develop and evaluate alternative solutions to problems.

The Staff advises on the design, development and use of management and data information systems and the evaluation of the effectiveness of NMFS management, programs, and activities. It coordinates the formulation, justification, and presentation of the NMFS program budget, including the development of program papers, annual budget estimates, and justifications for appropriations. It provides staff assistance to the Directorate in executing the budget, including preparation of data for appointments, allotment advices and control schedules, and preparation of re-

quests for supplemental appropriations and reprogramming actions. It performs analyses on the rate of progress in carrying out authorized programs and recommends changes, as necessary, to achieve best utilization of funds and manpower or to meet urgent unforeseen requirements.

Established in 1971, the authorized interdisciplinary Staff includes program analysts in the several activity areas and disciplines of the NMFS, as well as financial analysts and program specialists, and secretarial support.

While the organization has not yet achieved full staffing, it has met the routine workload and begun the development of an integrated system of national fishery planning. This involves the development of models to describe the various fishery systems of interest to the U.S., including significant influencing factors related to the biological, catching, processing, and marketing segments. Models under development, when expressed as mathematical relationships suitable for computer analysis, will make it possible to pre-test various types and levels of program and management responses to problem resolution. These models are expected to permit objective comparison of needs between fisheries on a national basis and assist in the optimum use of available resources.

Congressional And Legislative Affairs

That portion of the Office of Congressional and Legislative Affairs (NOAA) which is detached for service with the National Marine Fisheries Service (NMFS) is responsible for formulating and conducting work related to the legislative program of NMFS and the relationships of that Service with members of the Congress. The legislative program is complex and diversified in nature in that NMFS must deal with numerous legislative proposals and programs relating to or affecting the United States commercial fishing industry, the sportsmen interested in the marine recreational fishery, and the living natural resources utilized by or affecting both.

The detachment has responsibility for the preparation, coordination, and implementation of the NMFS legislative program and maintains liaison with the other components of the Office of Congressional and Legislative Affairs (NOAA), and with the Assistant General Counsel for Legislation in the Department in order to accomplish review and coordination of reports on specific legislative proposals and to assure proper response to a variety of Congressional requests for information and assistance. Additional functions of the office are to prepare testimony for hearings, attend hearings, review and correct transcripts of hearings as necessary, analyze Federal statutes bearing on NMFS programs, indicating the extent of impact on NMFS functions and general procedures; and provide general consultative and advisory services on legislative and related matters.

During the 2nd Session of the 92nd Congress, several new Federal laws pertaining to fisheries were enacted which specifically assigned certain controlling responsibilities and/or functions to the Secretary of Commerce. These laws, necessarily involving NMFS, include: an Act to authorize appropriations for FY 1973 for certain maritime programs of the Department of Commerce, including an authorization for the use of Liberty Ships as artificial fish reefs, P.L. 92-402, August 22, 1972; the Central, Western, and South Pacific Fisheries Development Act, P.L. 92-444, September 29, 1972; an amendment to the North Pacific Fisheries Act of 1954, P.L. 92-471, October 9, 1972; the Federal Ship Financing Act of 1972, P.L. 92-507, October 19, 1972; the Marine Mammal Protection Act of 1972, P.L. 92-522, October 21, 1972; the Marine Protection, Research, and Sanctuaries Act of 1972 (Ocean Dumping), P.L. 92-532, October 23, 1972; the Coastal Zone Management Act of 1972, P.L. 92-583, October 27, 1972; an Act to extend the Commercial Fisheries Research and Development Act of 1964, as amended (extend to FY 1977), P.L. 92-590, October 27, 1972; an amendment to Section 7 of the Fishermen's Protective Act of 1967 (extend to FY 1977, program administration transferred to the Secretary of Commerce), P.L. 92-594, October 27, 1972; an Act to prohibit use of certain small vessels in U.S. fisheries, P.L. 92-601, October 27, 1972; and an Act to authorize appropriations to carry out jellyfish control programs until the close of FY 1977, P.L. 92-604, October 31, 1972.

Although the Secretary of Commerce was not delegated overall program authority under the following Federal laws enacted during the 2nd Session, they have a significant impact on NMFS responsibilities and activities: the Ports and Waterways Safety Act of 1972, P.L. 92-340, July 10, 1972; the Federal Water Pollution Control Act Amendments of 1972, P.L. 92-500, October 18, 1972; an amendment to the Sockeye Salmon or Pink Salmon Fishing Act of 1947, P.L. 92-504, October 18, 1972; the Federal Environmental Pesticide Control Act of 1972 (revises the Federal Insecticide Fungicide, and Rodenticide Act), P.L. 92-516, October 21, 1972; an amendment to the Act of August 16, 1971, which established the National Advisory Committee on Oceans and Atmosphere, to increase the appropriation authorization thereunder, P.L. 92-567, October 25, 1972; and an amendment to the Fishermen's Protective Act of 1967 (expedite reimbursement), P.L. 92-569, October 26, 1972.

Public Affairs

The Public Affairs activities of the National Marine Fisheries Service are a function of the Public Affairs Officer and his staff who are detailed to NMFS and supervised by the NOAA Director of Public Affairs.

The NMFS Public Affairs Officer is responsible for liaison between NMFS and NOAA in all public affairs activities. He functions as a member of the staff of the NMFS Director and has close contact with the three NMFS Associate Directors and their division chiefs as well as the NMFS regional and center directors. The Public Affairs Officer is responsible for clearance of the Director's speeches and frequently coordinates the preparation of such speeches.

The Public Affairs Office produces national news releases; frequently prepares releases for regional release; prepares feature stories; arranges for interviews with NMFS personnel with representatives of all media; handles inquiries from the press, radio, TV, trade papers, and the general public. The Public Affairs Office also maintains close liaison with NMFS regional offices and centers on matters of public interest.

Marine Fisheries Advisory Committee

The Marine Fisheries Advisory Committee (MAFAC) was established February 17, 1971, by the Secretary of Commerce under provisions of Reorganization Plan No. 4 of July 1970 and Executive Order 11007, Section 3b, Act of July 1, 1954 (15 U.S.C. 713-3(c)). MAFAC members are appointed by the Secretary and advise him on matters pertinent to the Department of Commerce's responsibilities for marine fisheries resources.

The Committee held three meetings in Washington, D.C.: January 26-28, May 2-4, and October 24-26, 1972.

Membership of the Committee as of December 31, 1972 was:

Mr. Theodore T. Bugas, Director
Public & Gov't Relations
Bumble Bee Seafoods, Div. of Castle and Cooke, Inc.
P.O. Box 60
Astoria, OR 97103

Mr. Charles R. Carry
Executive Director
Tuna Research Foundation
215 Cannery Street
Terminal Island, CA 90731

Dr. James A. Crutchfield, Jr.
Department of Economics
University of Washington
Seattle, WA 98105

Mr. Jacob J. Dykstra
Point Judith Fishermen's Cooperative Association
Point Judith, RI 02882

Prof. John D. Isaacs, III
Scripps Institution of Oceanography
La Jolla, CA 92037

Mr. Harold E. Lokken
Fishing Vessel Owners Association, Inc.
Pier 59, Foot of Pike Street
Seattle, WA 98101

Mr. Henry Lyman
Salt-Water Sportsman
10 High Street
Boston, MA 02110

Mr. John A. Mehos
Liberty Corporation
P.O. Box 267
Galveston, TX 77550

Mr. Earl E. Engman
8018 Custer Road, S.W.
Tacoma, WA 98499

Mr. Ray H. Full
Kishman Fish Company
573 River Street
Vermilion, OH 44089

Mr. William B. Hannum, Jr.
Sea Farms, Inc.
813 Caroline Street
Key West, FL 33040

Mr. Allen W. Haynie
Haynie Products, Inc.
5010 York Road
Baltimore, MD 21212

Mr. Willard F. Rockwell, Jr.
Chairman & Chief Exec. Officer
North American Rockwell Corp.
North American Rockwell Bldg.
Pittsburgh, PA 90733

Mr. John J. Royal
Fishermen's Union, Local 33
International Longshoremen & Warehousemen's Union
San Pedro, CA 90733

Mr. William G. Saletic
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Seattle, WA 98107

Mr. Lawrence T. Schweig
Vita Foods, Inc.
2222 West Lake Street
Chicago, IL 60612

Mr. Richard H. Stroud
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Sport Fishing Institute
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Mr. Howard W. Nickerson
Executive Director
Seafood Dealers Association of New Bedford
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Mr. William A. Nungesser
President, Algiers Canning and Sales Company
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Mr. John M. Olin
Olin Mathieson Chemical Corp.
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St. Louis, MO 63105

Mr. Robert M. Thorstenson
Petersburg Fisheries
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Petersburg, AK 99833

Dr. James A. Timmerman, Jr.
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Wildlife Resources Department
217 Fort Johnson Road
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Mr. Clifford V. Varin
President, Fire Island Sea Clams Company
P.O. Box 85
West Sayville, NY 11796

Mr. W. Horace Witherspoon, Jr.
4645 Fairfield Drive
Corona del Mar, CA 92625

Mr. A. Burks Summers
7242 Wisconsin Avenue
Bethesda, MD 20014

Executive Secretary: John L. Baxter
National Marine Fisheries Service

RESOURCE RESEARCH

The Office of Resource Research plans, develops, and manages national research programs designed to better understand living marine resources and the environmental quality essential for their existence, and to describe options for their utilization consistent with national needs and goals. Programs are carried out at seven Centers, which coordinate and oversee research at 23 laboratories and field stations under their jurisdiction, and at eight laboratories and stations under the supervision of Regions or the Washington Office.

Research programs underway are categorized under seven major national efforts: resource assessment, aquaculture, impact of environmental change, marine mammals, life studies, oceanography, and fisheries technology. A brief description of each of these activities and accomplishments during 1972 follows:

Resource Assessment

During 1972, continued progress was made on the development of a coordinated Resource Assessment Program to define the kinds and quantities of living marine resources available and to provide a comprehensive data base for domestic and international management. Studies included are (1) the development of the Marine Resource Monitoring, Assessment, and Prediction Program (MARMAP), periodic surveys for the determination of the abundance and distribution of fish eggs and larvae, groundfish and pelagic fish, (2) analysis of catch data from commercial and sport fisheries, and (3) analysis of ocean environment data collected on cruises and available from all other United States and international sources. The ability to monitor, assess, and predict the abundance and distribution of fish populations remains the keystone in developing successful techniques of resource management.

In 1972, additional planning and testing required to develop the nationally integrated MARMAP Program was completed. The first multiple-ship test was successfully conducted in the Atlantic from Cape Cod to the Caribbean to evaluate the component subsystems for data collecting, handling, analysis, and reporting, of the egg and larval survey system. On this cruise the area and time of blue marlin spawning was determined in waters of the Gulf of Mexico and Caribbean.

By the end of 1972, standardized MARMAP sampling methods for eggs and larvae had been adopted by FAO and were being utilized by 20 nations including seven European, four African, five South American, and four Asian nations. In addition, a cooperative MARMAP-International Commission for the Northwest Atlantic Fisheries (ICNAF) survey to determine the magnitude of the herring spawning stocks in the Northwest

Atlantic was completed. Five countries participated in the survey, using standard MARMAP samplers and analytical procedures. Technical advances achieved in 1972 include development of: a system for automating the sorting of egg and larval samples; a shipboard data logging system; and progress in the development of a new automatic ichthyoplankton and environmental sampling system in cooperation with the United Kingdom.

In addition to the comprehensive MARMAP effort, intensive surveys are undertaken to study in detail single species populations of major importance adjacent to our coasts. These studies satisfy immediate demands for management recommendations regarding exploited species, especially those subject to treaty, international agreements, and State/Federal regulations. Accomplishments during 1972 include (1) the preparation of scientific documents for bilateral fisheries negotiations with Canada, Japan, USSR, Brazil, Mexico, and European countries involved in the Atlantic and Pacific fisheries, (2) assessment of the abundance of cod, haddock, hake, flounder, and pollock on the Atlantic coast, (3) completion of an analysis of shark abundance and distribution off the east coast of Florida and the Gulf which resulted in an expansion of this underutilized resource, and (4) completion of an anaylsis of the population response of menhaden to various rates of fishing.

Aquaculture

Aquaculture programs were carried out on means to propagate, grow, and maintain fish and shellfish in controlled environments with emphasis on selective breeding, nutrition, and disease. Major emphasis currently is being directed to the culture of salmon, shrimp, and oysters.

Salmon culture research underway in the Northwest involves the preparation and testing of diets, development of stocks suited for pen culture in marine waters and the identification and control of salmon diseases. Shrimp culture studies headquartered at the Galveston, Texas, Laboratory are directed toward developing techniques for the sexual maturation of shrimp in captivity, description of the nutritional requirements of shrimp, preparation and testing of economical foods, and studies of shrimp diseases and their control. Oyster culture work is concentrated on improving larval culture methods, developing large-scale culture techniques for algal foods, and enhancing survival stocks through development of improved genetic strains.

Accomplishments in 1972 include the enhancement of the recreational fishery for salmon in Puget Sound brought about by the release of juvenile salmon after a period of rearing in saltwater pens. In Alaska, excellent returns of adult coho salmon occurred from planting fry in barren lakes. Achievements in shrimp culture include development of a method for

preserving algal foods, improved circulation systems and automation of shrimp larvae feeding.

Impact of Environmental Change

Research underway on environmental changes includes studies of estuarine and nearshore ecosystems to establish baseline data in order to evaluate the ecological impact of manmade and unusual natural changes.

Work is being carried out to delineate: (1) the nature and extent of pollutants in the marine environment and their effect on living marine organisms, (2) the cycling of pollutants through the food chain, and (3) the impact of various manmade and natural alterations of the environment on marine life.

During 1972, Service researchers in Alaska determined the concentrations of Prudhoe Bay crude oil that are toxic to pink salmon fry. They also found that fry will avoid certain concentrations of oil which may result in changes in migratory behavior during periods of oil pollution. In the Gulf, a quantitative evaluation was made of the effects of newly dredged canals for waterfront housing on abundance of fish and bottom organisms. Other studies on the Atlantic coast established the association of abnormalities and diseases of marine fish life with ocean pollution.

Marine Mammals

Marine mammal programs involve research on the life history and population dynamics of whales, porpoises, and seals to establish management controls and techniques for their protection and conservation. During 1972, "Operation Porpoise Lifeline" was initiated with the goal to reduce and hopefully eliminate porpoise mortalities in the tuna purse seine fishery. Two prototype nets designed to minimize porpoise mortality were constructed and preliminary tests were commenced to evaluate their effectiveness. On the Pribilof Islands and North Pacific Ocean, research was carried out on the age structure, population dynamics, feeding habits, distribution, and migration of fur seals and their interrelationships with other living marine resources.

Life Studies

Life studies include research on the physiology, anatomy, behavior, identification and classification, pathology, biochemistry, reproduction, migrations, growth, and food and feeding of marine fish and shellfish. A number of projects are underway at Service laboratories dealing with

various life processes of economically important marine species. Knowledge obtained from such studies provide essential ingredients in formulating management measures.

Significant accomplishments on life studies research during 1972 include the following: completed a multi-State and international program of tagging and releasing 15,000 sablefish from California to southeastern Alaska to define the life history and population structure of this species; arranged and organized an International Billfish Symposium to synthesize the status of knowledge on the life history of these important gamefish; established a realistic minimum size limit for Atlantic yellowfin tuna for international consideration as a management improvement measure; spawned haddock in the laboratory (the first time in this country) for the purpose of obtaining larvae for survival and growth studies; and completed taxonomic studies of hake and penaeid shrimp.

Oceanography

Oceanographic research is being carried out at three Research Centers and the Atlantic and Pacific Environmental Groups on the physical, chemical, and biological properties of the oceans and the dynamics of the organic producing systems.

Accomplishments during 1972 include the establishment of the Atlantic and Pacific Environmental Groups in Washington, D.C., and Monterey, California, respectively. These Groups provide environmental support for the Resource Assessment Programs and are responsible for the analysis, correlation and synthesis of environmental and biological data.

Additional accomplishments include the analysis and transmittal of sea state and meteorological phenomena received from many sources to the tropical Pacific tuna fleet via radio facsimile to assist the fleet in making tactical decisions. Other studies were carried out to define oceanic currents and circulation and their effect on plankton biomass and on dispersal of fish eggs and larvae.

Fisheries Technology

Ongoing work on fisheries technology includes the development and evaluation of sampling equipment, harvesting methods, hydroacoustic and aerospace remote sensing techniques, and data processing and analysis methods for use in biological research and in the fishing industry.

A cooperative NOAA/NASA experiment was conducted in Mississippi Sound to investigate correlations between remotely sensed environmental parameters and menhaden distribution. Data on resource distribution were obtained from cooperating menhaden industry vessels, daytime aerial photography and nighttime low-light-level image intensifier flights.

Examination of available image analysis systems demonstrated that at least one concept has potential for increasing accuracies and reducing labor costs of determining age and other factors from fish scales. Work will now proceed to achieve operational capability.

RUFAS (Remote Underwater Fishery Assessment System) was placed in routine operational use as a survey system in the Southeast. RUFAS (equipped with TV and photography cameras) travels over the seabed and provides a permanent record of the abundance and distribution of bottom-dwelling marine life.

RESOURCE UTILIZATION

The Office of Resource Utilization plans and manages: (1) economic and marketing research (including demand and supply projections, benefit cost studies, and foreign trade analyses); (2) the collection, analysis, compilation, and dissemination of fishery statistics and market news information; and administers: (3) fishing industry assistance, providing for loans, mortgage and loan insurance, tax deferrals, and seizures guarantees; (4) microbiological, chemical, and technological research to enhance the quality and utilization of fishery resources; (5) a voluntary national program of inspection and certification of fishery products; (6) programs to improve marketing practices and to alleviate extraordinary short-term supply-demand imbalances; and (7) national research programs in fishery products technology. The Office consists of five Divisions; Economic Research, Financial Assistance, Statistics and Market News, Market Research and Services, and Fishery Products Research and Inspection.

Economic Research

The Economic Research Laboratory, College Park, Md , provides economic analysis by major fishery to identify problems, assess opportunities, and relate benefits to costs for fishery programs. These analyses provide some of the bases for formulating and evaluating policy and programs for both commercial and sport fisheries. In addition, economic studies dealing with the profitability of fishing operations, projections of demand for fishery products, economic feasibility of various new technologies, and other related studies are used by the fishing community, investors, banks, and the general public.

The work of the Laboratory is complemented and coordinated with Regional Economists in NMFS regional offices. The Regional Economist primarily provides economic advice to the Regional Director and administers various research contracts. To a lesser extent, but from time to time, the Regional Economist works with the Laboratory on various research projects.

There are five major long-run program areas of economic research: (1) State-Federal fishery management—evaluates the economic impact of alternative management schemes designed to conserve the resource and insure the economic prosperity of fishermen; (2) recreational demand and living marine resources—explores the extent of the sport fishing industry as well as ways of evaluating sport and commercial resources; (3) competitiveness of the U.S. fishing industry—assesses the productivity, earnings, costs, and general ability of U.S. fishermen to compete not only with foreign producers, but with producers of other protein substitutes as well; (4) Government program analysis—designed to use the results of the more basic research on the commercial and sport fishing industries in evaluating existing Government programs, new initiatives, and new legislative authority; and (5) environmental hazards—explores the economic consequences of water pollution on the marine environment and the cost to the fishermen of meeting pollution standards.

Accomplishments of the economic research program include:

(1) Completion of an extensive study on the extent of capitalization in U.S. fisheries designed to identify those fisheries which have too many vessels and fishermen relative to the resource potential so that corrective action may be taken by NMFS through management schemes or alterations in financial assistance policy.

(2) Completion of a multitude of studies designed to revitalize the New England fishing industry, including studies on (a) alternative fishery management schemes for inshore American lobster; (b) the impact of remaining import duties on gear, nets, and electronic equipment; and (c) a general study of the major factors contributing to the poor economic condition of New England trawlermen as an aid to policy formulation.

(3) Assisting the Financial Assistance Program of NMFS by providing policy and research position papers dealing with: (a) overcapitalization; (b) upgrading of fishing vessels; (c) administration of the Fisheries Loan Fund and the problem of delinquencies; (d) evaluation of the 1972 Federal Ship Financing Act; and (e) analysis of construction cost data to be used in administering the Capital Construction Fund.

(4) The Southeast Regional Economist was instrumental in analyzing the opportunity for two businesses in the fishing industry of considerable importance to large numbers of disadvantaged people. The economist helped develop pro forma financial statements, capital budget, business strategy, and assess the risk of the project to various lending agencies. These projects may potentially benefit 300 black families in rural Mississippi and 200 fishermen on the outer banks of North Carolina.

Financial Assistance

The Financial Assistance Division administers four programs of assistance to the domestic commercial fishing fleet.

The Fisheries Loan Fund program makes loans where reasonable private credit is otherwise unavailable, for the financing or refinancing of the cost of purchasing, constructing, equipping, maintaining, repairing, or operating new or used fishing vessels or gear. Applications totaling over $2.2 million were received under this program during 1972; 41 cases, totaling about $1 million, were approved. Since its inception in 1956, this program has lent about $31.3 million to fishing vessel owners.

The Fishing Vessel Mortgage and Loan Insurance program insures private construction loans before the delivery of new or reconstructed or reconditioned vessels and long-term mortgages after delivery. Insurable loans or mortgages must have aided in financing the cost of constructing, reconstructing, or reconditioning fishing vessels of 5 net tons or over. A total of 46 applications totaling over $3.6 million were received under this program during 1972; 29 for a total of about $2.3 million were approved. Since a statutory distinction was made in the insurance of fishing vessel mortgages and loans in 1960, this program has insured fishing vessel mortgages worth almost $40 million.

On October 19, 1972, the President signed H.R. 9756 into law as the Federal Ship Financing Act of 1972 (P.L. 92-507). This Act significantly amends Title XI of the Merchant Marine Act, 1936, as amended, the authority under which the Fishing Vessel Mortgage and Loan Insurance program had existed prior to October 19. The purpose of P.L. 92-507 is to expedite procedures, simplify paperwork, and better meet the industry's need for investment capital. The Act will significantly increase program activity by (1) establishing the Government (instead of the guaranteed lender) as mortgagee and (2) broadening the uses (although still tied to construction, reconstruction, or reconditioning) for which guaranteed obligations are available. Assistance provided under this program is expected to at least double during the coming year. Rules and regulations implementing the Act should be in effect shortly after the end of the year.

The Fishermen's Protective Act program guarantees reimbursement of certain costs incurred by domestic fishing vessels resulting from seizure by foreign governments on the basis of rights or claims in territorial waters of the high seas which are not recognized by the United States. Other than costs paid by the Department of State, this program guarantees the cost of (1) damages to or destruction of vessels or gear, (2) loss or confiscation of vessels or gear, (3) dockage fees or utilities, (4) confiscation or spoilage of fish, and (5) up to 50 percent of gross income lost during seizure and/or detention. Participants pay fees designed to cover the program's administrative cost and at least 33⅓ percent of paid claims. During 1972, 147 participants paid about $162,000 in fees; close to $353,000 in claims were paid; and about $90,000 in claims were pending. During November, 18 tuna vessels owned by participants were seized by Ecuador. Potential claims resulting from these 18 seizures are estimated to be about $150,000-$200,000.

Legislation affecting the programs during the year also included P.L. 92-594 which extended the Fishermen's Protective Act program until July 1, 1977.

The Capital Construction Fund program provides tax deferral benefits to fishing vessel owners or lessees upon deposit of certain funds. Withdrawals are made for the acquisition, construction, or reconstruction of fishing vessels or for the payment of the principal of indebtedness incurred for those purposes. A total of 173 Capital Construction Fund agreements had been executed through the end of 1972; 144 were being processed; and as many as another 50 applications are expected shortly after the end of the year. Over 1,000 fishing vessels are estimated to be involved, with deposits qualified for tax deferral estimated at about $7 million and withdrawals estimated at about $4 million.

The year was one of change and of much effort directed towards what may eventually result in significant program redirection. A NOAA Task Group on Financial Assistance submitted a draft of its report during the year. Living Marine Resources, Inc., was awarded a contract during the year for an evaluation of Financial Assistance programs and a study of the industry's future need for Federal financial assistance. Early next year, when the contractor's final report is due, these two documents should form significant bases for decisions on program redirection.

Statistics and Market News

The Service's data collection and dissemination program consists of three major components: commercial fisheries statistics, marine sport fisheries statistics, and market news.

COMMERCIAL FISHERIES STATISTICS

As part of the commercial fisheries statistics program, the Service collects, stores, and publishes statistics on the commercial fishing industry of the United States. Included are: the volume and value of the commercial landings of fish and shellfish by species, region, State, and type of gear; number of fishing craft and gear operating in the fisheries; the production of processed fishery products; imports and exports of fishery products; employment on fishing craft and in wholesale and fish processing establishments; cold-storage holdings of fishery products; and the per capita consumption of fishery products. The Service maintains 44 statistical offices in the major fishing ports of the United States. Much of the statistical data are collected by field personnel with the cooperation of several State fishery agencies.

During 1972, these data were published in over 300 monthly, quarterly, and annual statistical publications which were distributed to private industry; Federal, State, and local government agencies; libraries; universities;

research institutions; foreign industry and government; and United States Embassies. In addition, several thousand requests for information or special data were answered.

Certain field installations expanded their biological sampling activities as an aid to the Service's biological programs, to meet commitments under international agreements and treaties, and to assist international agencies engaged in studies of fishery resources. A program was established for collecting detailed shrimp statistics required under the terms of a bilateral fisheries agreement with Brazil. A program for collecting nationwide statistics on production by the developing pond-cultured catfish industry was begun in the summer of 1972. Monthly data on production and inventories of processed catfish also will be collected and disseminated.

The Service established a Committee on Data Needs to make recommendations concerning the types of data that should be collected and published in *Fishery Statistics of the United States*. During 1972, the monthly landings bulletins for several States were computerized and data collection time was decreased.

MARINE SPORT FISH STATISTICS

The responsibility for collecting marine sport fish statistics was transferred to the Department of Commerce from the Department of the Interior with the creation of NOAA under Reorganization Plan No. 4. In June 1972, a two-phase contract study was completed. The objectives of the study were: (1) to determine the causes of response bias in collecting sport fish statistics through personal interviews and to develop means of correcting such biases; and (2) to conduct a pilot household survey to test the means for decreasing the response biases.

A contract was awarded to a private researcher to: (1) develop a priority listing of marine sport fish data needs and; (2) prepare two 5-year program plans for collecting marine sport fish statistics, each plan based on three different funding levels. A draft report of this study was submitted in December 1972.

MARKET NEWS PROGRAM

The Service's Market News Program provides current information on market activities. Seven reporting centers issue reports three times a week containing data on current market prices, landings, imports, holdings and movements of fishery products, as well as other information to promote efficient and orderly marketing of fish and shellfish and products prepared from them.

Early in 1972, a questionnaire was sent to 10,000 readers of Market News Reports to determine what kinds of market information people want, how

often they want the information, and the form in which they want it. Results of this survey will be used in the Service's continuing in-house efforts to determine the most effective and efficient way of collecting, processing, and distributing market information.

The installation of Xerox 400 Telecopiers in Market News offices has improved efficiency of the program and service to the general public.

During the 1972 halibut season the Seattle, Washington, Market News office expanded coverage to include daily halibut landings and prices in Seward and Yakutat, Alaska. Other Market News coverage refinements in 1972 include more complete current reporting of airfreight shipments of fishery products from Seattle and Anchorage, Alaska, as well as more complete coverage of albacore tuna landings in the Pacific Northwest and British Columbia.

Market Research and Services

The Service's marketing activities encompass two areas, i.e., market research and marketing services. Research-related activities include: (1) conduct of market surveys to determine consumer use patterns, consumer attitudes and demand trends, and distribution and marketing patterns for fishery products; and (2) preparation of quarterly market situation and outlook analyses. Service-related activities include: (1) alleviation of periodic supply-demand imbalances; (2) development of markets for abundant underutilized species; (3) development of export markets for U.S. products; (4) improvement of marketing practices at all levels in the distribution chain; (5) consumer education; (6) providing technical assistance to fisheries cooperatives; and (7) assisting the industry in meeting its transportation needs.

The foregoing market research and service activities are designed to enhance the economic position of the U.S. commercial fishing industry and, simultaneously, to provide consumers with a greater variety of quality fishery products. The NMFS marketing effort is carried on by industry economists, marketing specialists, and home economists in a division office in Washington, D.C., and in 13 field offices, strategically located throughout the United States.

Significant accomplishments in calendar year 1972 included:

1. Market feasibility studies were completed for ocean perch, snow crab, pan-sized salmon, and croaker. These studies were made to determine product acceptability in major institutional markets, to measure market potential for these species, to make recommendations as to how the products might be modified to gain better market acceptance, and to generally assist in developing and expanding the markets for these products.

2. Efforts were initiated to develop export markets for mullet and mullet roe. Preliminary observations indicate excellent potential in Japan and

France. In recent years, the production of mullet in the U.S. has been about 35 million pounds; potential production is estimated to be about 200 million pounds. Export opportunities were also identified for such underutilized species as croakers, ladyfish, bonito, Spanish mackerel, Jonah crab, ocean quahogs, and squid.

3. The market for comminuted[1] fish portions was studied to assist industry in the development of marketing strategies for this new fishery product form.

4. The NMFS marketing program underwent extensive review by an outside contractor and an industry advisory group. The purpose of the review was to determine how the NMFS marketing efforts might make a more meaningful contribution to NOAA/NMFS goals and objectives. Based on recommendations stemming from this review, the NMFS marketing program is being focused on latent resource development, consumer education and market intelligence.

Fishery Products Research and Inspection

The Service conducts a broad program of basic and applied research related to the processing and utilization of fish and fishery products. A fishery products inspection and certification service is also available on a fee basis to processing establishments requesting it.

Overall direction and management of research activities other than those underway in the Pascagoula Fishery Products Technology Laboratory are the responsibility of the Fishery Products Research and Inspection Division in Washington, D.C. The Pascagoula Laboratory reports to the Southeast Regional Office, but its program is coordinated with that of the other laboratories. The other research facilities include the Atlantic Fishery Products Technology Center in Gloucester, Mass.; the Pacific Fishery Products Technology Center in Seattle, Wash.; a field laboratory at Kodiak, Alaska, under the direction of the Seattle Center; and the College Park Fishery Products Technology Laboratory in College Park, Md. These Centers and Laboratories employ food technologists, engineers, chemists, nutritionists, microbiologists, and various technicians with backgrounds in the life and physical sciences. The research facilities include chemical and microbiological laboratories as well as pilot plants.

The work of the Division is classified under six broad program areas: (1) utilization technology, including fish protein concentrate (FPC); (2) microconstituents; (3) quality, composition and nutrition; (4) pollution control; (5) process-induced hazards; and (6) inspection and certification.

Highlights of these programs in 1972 are given below:

[1]Minced fish flesh separated mechanically from the bone.

UTILIZATION TECHNOLOGY

Substantial progress was made in studying the processing parameters and product development in conncetion with the use of mechanical meat/bone separators for recovering edible meat from underutilized fish and fish parts which presently have a low monetary value. Besides demonstrating the feasibility of producing minced fish meat, work progressed on improving the color, flavor, and cold-storage characteristics of minced fish meat. The result of this research to date was presented at a three-day seminar for the fishing industry sponsored by the National Marine Fisheries Service and the National Fisheries Institute, and in several publications.

Technologists and engineers have continued to investigate methods of preserving fish prior to processing into fish protein concentrate (FPC) and ways to improve the flavor and functionality of the final product. Accomplishments include refinement of the economic model for evaluation of the potential for FPC, improvement of FPC flavor through the use of hydrogen peroxide, development of methods for storing fish for FPC processing, and development of a modified method for preparing an FPC product with desired functional properties.

The FPC research program provided technical and analytical support for the operation of an Experiment and Demonstration Plant at Aberdeen, Washington. Legislation providing for the continued operation of the FPC pilot plant was not renewed in the 92nd Congress. The plant ceased operation in June 1972, after producing over 200 tons of product of which 47 tons met all FDA specifications for food-grade quality.

FPC was provided to a number of public and private groups, including American Samoa where 3,000 preschool children were given nutritious snacks of FPC cookies. Samples of FPC were also provided to numerous food companies and research facilities for continued evaluation of its uses.

Stable fish protein isolates were prepared by both enzymic and chemical modification of fish meat. These isolates are suitable for use in processed foods. Their desirable functional properties include solubility, gel-forming capacity, lipid-emulsifying capacity, and whippability. This research could lead to totally new uses for fish protein by many segments of the food processing industry which currently use products such as egg whites and dry milk solids for producing textural properties in foods.

Techniques were developed and refined for holding fish and shellfish in refrigerated seawater saturated with carbon dioxide (RSW-CO_2). Cooperative experiments with California trawl vessels showed that the RSW-CO_2 method improved the landed quality of Dover sole and would permit longer fishing trips.

In Alaska, experiments aboard vessels showed that the mortality of live snow crabs could be cut drastically, thus increasing vessel earnings and providing additional supplies to processors.

Microwave energy was studied as a way to facilitate the shucking of oysters and other bivalve mollusks and as a way to thaw or temper blocks of frozen fish and shellfish. As a result, several microwave units have now been purchased by industry for these purposes.

A rapid method was developed and demonstrated for producing shelf-stable high-quality, salt-cured fish. A pilot-scale demonstration unit was operated at the fish pier in Gloucester, Massachusetts, using several underutilized species.

A method was developed for heat-processing blue crab that improves the quality of the picked crab meat. In addition, the yield of crab meat was shown to increase, thus making potential profits higher for industry.

MICROCONSTITUENTS

Research chemists assessed the nature and the extent of microconstituents in fish and shellfish. Particular attention was given to trace elements such as mercury, lead, arsenic, and cadmium. A survey of 34 species for these elements was completed. An extensive survey was begun which will involve collecting samples of about 100 different species of fish and shellfish. These samples are being analyzed for 15 elements.

Information from these surveys will be put into a computerized data base. The results will be used to: (1) assess changes in contaminant levels in the future; (2) provide factual scientific evidence on contaminants in seafoods; and (3) based on known quantities of seafoods consumed and known microconstituent levels, provide evidence to the Food and Drug Administration on the advisability of lowering or raising present or future guidelines on trace elements.

In addition, methods have been demonstrated which will substantially reduce mercury in some fishery products through enzymatic solubilization.

Results of the program can materially reduce industry costs by pointing out areas which should not be fished, reducing the quantity of fish which must be tested, and reducing storage costs while awaiting testing.

Studies are also underway to determine levels of DDTs and PCBs in seafoods.

NUTRITION

The nutritional qualities of seafoods are being defined to determine their role in human and animal diets and to form the basis for identifying new uses. A comprehensive source of information on the nutrient composition of fish is being developed. Basic studies are conducted on the biological utilization of consumed nutrients. Studies have shown an excellent potential for using fish protein in liquid formulas for calves. Ways in which fish byproducts and waste products can be used in animal diets are also being evaluated. The nutritional requirements of fish are being studied. Informa-

tion in this area will be needed for the successful development of aquaculture.

POLLUTION CONTROL

The Division has assisted in determining the composition of effluents and reducing the amount of pollutants emanating from fish processing plants. Methods of recovering waste products have been evaluated in connection with the FPC Experiment and Demonstration Plant. Preliminary tests of the treatability and utilization of processing wastes at Kodiak, Alaska, have been conducted, using a combination of screening and chemical treatment. The Division assisted the National Fish Meal and Oil Association in planning and testing pollution abatement systems. Reports and technical papers inform industry, government, and other interested persons of research developments.

PROCESS-INDUCED HAZARDS

In a cooperative study with the Atomic Energy Commission, the relationship of bacterial viruses to the toxicogenicity of *Clostridium botulinum* is being investigated. Processing requirements necessary to inhibit *C. botulinum* in fishery products are being determined.

INSPECTION SERVICES

Fishery products inspection and certification services were carried out at 45 processing establishments and 10 lot inspection stations located in 22 States. The services were conducted mostly under contracts requested by fish processing companies to ensure that the fishery products examined met U.S. grade standards for processed fishery products, and that the products were prepared under suitable, hygenic conditions. In 1972, about 340 million pounds of seafood products were inspected and certified, including 72,000 pounds of fish protein concentrate (FPC) inspected for compliance with requirements of the Food and Drug Administration.

During 1972, the inspection service developed and published guidelines relating to quality control systems for processing plants. These will lead to improved and lower cost methods of inspection in which the company quality control system works in conjunction with the Government inspector.

A new general standard of quality for fresh or frozen whole or dressed fish was developed to assist U.S. consumers in judging and certifying the quality of these products.

New regulations for fishery product names and descriptions provide for fishery products labels which are more uniform and understandable to the consumer.

More convenient standards were developed which enable production plants to make measurements during the process when control can be changed, rather than on the finished products.

RESOURCE MANAGEMENT

The Office of Resource Management plans, develops, and evaluates programs to improve State and Federal management of fisheries resources and their environments. This office also has a unique responsibility for the care and welfare of some 630 Aleut residents of the Pribilof Islands, Alaska. In carrying out its function, the Office of Resource Management works cooperatively with a number of other agencies. These include the U.S. Environmental Protection Agency; U.S. State Department; U.S. Coast Guard; Office of Sea Grant; U.S. Corps of Engineers; Bureau of Sport Fisheries and Wildlife; fisheries agencies of the 50 States and Puerto Rico, the Virgin Islands, Guam, and American Samoa; the Atlantic States Marine Fisheries Commission, the Gulf States Marine Fisheries Commission, and the Pacific Marine Fisheries Commission; the Council of Governments; and a number of prominent conservation organizations such as the American Fisheries Society, Sport Fishing Institute, National Wildlife Federation, Wildlife Management Institute, and the Wildlife Society.

In 1972, the Office of Resource Management included a Division of Water Resources Management, Division of Extension, Division of Enforcement and Surveillance, and a Division of State-Federal Relationships. Staff support was also provided to the Pribilof Islands Management Program and the Columbia River Fisheries Development Program, both of which are administered by the Regional Office at Seattle, Washington. In late 1972, the Office of Resource Management assumed responsibility for administering the Marine Mammal Protection Act of 1972.

Water Resources Management

In 1972, Water Resources Management in the National Marine Fisheries Service maintained a dual role, as it has since reorganization in 1970. These roles are:

(1) To conserve, protect, and enhance the fishery resources of the marine, estuarine, and those inland areas supporting a significant commercial fishery under a variety of legislative requirements (particularly the Fish and Wildlife Coordination Act of 1958, the National Environmental Policy Act of 1969, and the Fish and Wildlife Act of 1956) relative to federally-constructed or licensed water resources projects and those projects constructed under Federal permit or with Federal funding. This is done by consolidating

NMFS expertise and applying it to direct, systematic participation in environmental decision-making in cooperation with Federal and State agencies involved in water resources planning and development.

(2) To carry out the Columbia River Basin Development Program under the authority of the Mitchell Act to restore the anadromous fish runs of the Columbia River system that have been impeded and disrupted by construction of dams and other water projects.

During 1972, the major effort in Water Resources has been to continue implementation of plans to develop staffing and to consolidate expertise that will assure compliance with the NOAA/NMFS legislative mandates. This restructuring of agency priorities required plans for the reprogramming of personnel and funds to satisfy not only the immediate demands for comments on permits for work in navigable waters (section 10 permits) in each Region, but also plans for placement of personnel to satisfy potential future demands.

This Division has responsibility within NOAA/NMFS for the following specific Environmental Impact analysis activities either required or permitted by legislative authorities:

1. Corps of Engineers "Dredge and Fill" (Section 10) permits.
2. Comments on Atomic Energy Commission and Federal Power Commission license applications.
3. Permits and Projects of Bureau of Land Management, Soil Conservation Service, and the Forest Service.
4. Comprehensive Basin Studies under the Water Resources Council.
5. Contingency Plans for Oil and Hazardous Substances.
6. Environmental Impact Statement review and comment.
7. Preparation of Reports on federally-constructed projects.
8. Coordination of procedures with BSF&W, States, planning and development agencies, and NMFS laboratories.

There are over a dozen Federal agencies whose activities affect living aquatic resources; therefore, projects of each require that comments or responses be coordinated or prepared by Water Resources. In order to assure proper participation, memoranda of understanding among agencies are desirable. Such memoranda have been solicited with the Forest Service, Environmental Protection Agency, Bureau of Reclamation, and the Water Resources Council.

Activities of the Division of Water Resources Management were carried out in all five National Marine Fisheries Service Regions during 1972.

Significant accomplishments in 1972 included:

1. Preparation of sections of the final Environmental Impact Statement covering the environmental setting of the Trans-Alaska pipeline system between Port Valdez, Alaska, and west coast ports. These sections dealt with physical, chemical, and biological oceanography as well as both commercial and marine sport fisheries.

2. Assisted the Division of Conservation, U.S. Geological Survey in preparing a draft Environmental Impact Statement on future oil drilling at the Santa Ynez Unit area in the Santa Barbara Channel, California. This involved preparation of a bibliography of more than 120 references pertinent to the marine environment and its relation to oil drilling. Additionally, a detailed outline of the topics of special concern to the protection of the marine ecosystem was provided to insure that those subjects would receive adequate discussion in the final EIS.

3. Development of a mechanism for closer coordination with the New England Division of the Corps of Engineers with respect to providing advice and guidance on proposed Corps projects in navigable waters. Initially, the emphasis will be on about 20 planned harbor dredging projects in the Long Island area.

4. Consultation with the Consolidated Edison Company on the use of fish screens in preventing losses of eggs and larvae of striped bass and white perch that were being sucked into intakes of power plants on the Hudson River. As a result of these consultations, the power company funded experimental studies to design screens that will protect these important Hudson River species.

5. A waterfront developer on Galveston Island, Texas, violated an NMFS recommended condition in a Department of the Army permit by building a spoil disposal area levee in a tidal marsh rather than on higher ground. The project was stopped and after considerable discussion with NMFS personnel, the developer agreed to relocate the spoil disposal area to higher ground and to restore the tidal marsh area to its prior tidal elevation.

Extension

The NMFS Extension Program is an integral component of the NOAA Marine Advisory Service (NMAS) which was officially implemented in December 1972. There are nine full-time Extension (advisory) personnel in the Washington and Regional Offices. Key contact personnel have also been designated at appropriate NMFS Centers and regional facilities to help provide program integration and guidance to the Extension staff in meeting NMFS's responsibilities to NOAA Marine Advisory Service.

The primary responsibilities of NMFS advisory staff are to: (1) ensure that advisory services relative to the NMFS mission are adequate; (2) work with the Sea Grant Office to assist States and Sea Grant organizations to improve existing services or to ensure that new services are provided where required; (3) assist in the preparation of NMAS plans and reports; and (4) serve as a principal source of technical expertise, information and assistance in marine fisheries-related subjects.

Advisory services accomplishments of NMFS include:

1. Systematic utilization of meetings and publications as techniques to convey practical information to users. In 1972, NMFS Regional Offices, Centers, and Laboratories sponsored, co-sponsored or otherwise participated in some 706 educational meeting activities such as town hall meetings, workshops, demonstrations, discussion groups and seminars for about 26,600 users. The meetings covered a wide range of subjects regarding NMFS programs, activities and research results. The first four issues of the new Extension publication series, "Fishery Facts," were also printed and distributed with another three manuscripts approved for publication. The Northeast Region also prepared and distributed four medical assistance placards for use by sport and commercial fishermen.

2. Strengthening of marine advisory services to the seafood industry in the Alaska, Northeast, and Northwest Regions through planning meetings and program coordination with Sea Grant advisory programs and appropriate State agencies and groups.

3. Assessment of educational needs of commercial fishermen in regard to business management through: (a) completion of a survey of business management educational needs of North Carolina fishermen; (b) exploration of new credit sources for fishermen through meetings between appropriate Regional Office officials and officials responsible for carrying out the Farm Credit Act of 1971; and (c) cooperative activities with the NOAA Marine Advisory Service, NOAA Office of General Counsel, and the Internal Revenue Service regarding record keeping for tax purposes.

4. Implementation of joint activities with U.S. Coast Guard and NOAA Marine Advisory Service to develop educational materials regarding (a) USCG rules and regulations affecting fishermen and (b) reduction of accidents at sea.

Enforcement and Surveillance

The Enforcement and Surveillance program: develops, promulgates, and enforces domestic fisheries regulations required under the authority of 18 international fisheries agreements to which the United States is a contracting party; enforces observance by foreign fishing vessels of the contiguous fisheries zone and territorial waters; and provides intelligence on foreign fishing fleets off the United States needed for enforcement and for negotiations regarding foreign fishing. The program is largely planned and conducted in cooperation with the U.S. Coast Guard, which provides aerial and surface patrols, and the NOAA National Marine Fisheries Service, which provides Fisheries Enforcement

Agents for fisheries and law enforcement expertise. Surveillance seeks to ensure that territorial waters and the contiguous fisheries zone are respected and that the provisions of the international agreements are observed by the foreign fleets. In addition, information derived from surveillance is used in the formulation of the U.S. international fishery policy. Not only does this information allow the United States to follow the innovations and trends in foreign fishing vessels and gear, but it helps through estimates of catches and fleet movement to determine when discussions leading to agreements should be sought and provides information needed in the negotiations. Since World War II, foreign fishing off our coasts has increased markedly. Sighting of foreign vessels vary from month to month but presently fall within a range of 250-1,500 per month.

In the Northwest, protection of the salmon resources from the foreign trawl fisheries is of great concern. Other species such as ocean perch and Pacific hake are also important to the economy of the Northwest. Increased surveillance is necessary to assure that traditional resources are adequately protected under the present international agreements. Along the California coast the major emphasis is directed toward yellowfin tuna. Enforcement of tuna regulations established by an international commission is required. These are becoming more complex each year. In the Gulf and South Atlantic, an increase in foreign activities has been noted. In the North and Middle Atlantic, the activities of foreign vessels are well known. Under international agreement (ICNAF), haddock, cod, yellowtail flounder, herring, and silver and red hake resources are now under an annual quota system. In Alaska, almost constant surveillance of foreign activities is required to protect our contiguous fisheries zone. The continual need for air patrols is evident by the number of violators that have been successfully prosecuted.

In calendar year 1972, 30 Fisheries Enforcement Agents logged approximately 300,000 aerial miles and 120,000 nautical miles on fisheries patrols. Major accomplishments were:

(1) The seizure and arrest of two Russian fishing vessels conducting illegal fisheries support activities within U.S. waters off Alaska (total fine—$250,000).
(2) The seizure and arrest of two Japanese fishing vessels conducting illegal fisheries support activities within the U.S. Contiguous Fisheries Zone off Alaska (total fine—$180,000).
(3) The apprehension of four Japanese fishing vessels gillnetting salmon in the Gulf of Alaska in violation of international agreement.
(4) Thirty-three boardings and inspections of foreign fishing vessels which, for the first time, put into force the international inspection scheme of the International Commission for the Northwest Atlantic Fisheries (ICNAF).

State-Federal Relationships

The formal organization of the Office of State-Federal Relationships this year was the result of growing awareness of the necessity for a more active Federal role in furthering state cooperation in fisheries management. The program seeks to encourage cooperation among the States to develop comprehensive management plans for fisheries over the entire range of their distribution, rather than on a fragmented State by State basis. Management plans will be devised that will facilitate the optimal allocation of our living marine resources among commercial fishermen, sport fishermen, and other users, and insure the continued viability of the resource.

By its nature, the Office of State-Federal Relationships is not research-oriented, but depends primarily on: research completed under its own grant-in-aid programs, other activities within NMFS and NOAA, other Federal agencies, the States, and consultants to provide information necessary for the development of management programs. One important function of the State-Federal program, therefore, is to identify, monitor and coordinate needed research activities.

While biological research and population assessment studies are essential to proper fisheries management, one of the major thrusts of the program is to undertake economic and social studies of various fisheries. Much of this needed research is being done by the Economic Research Laboratory. Other projects are nearing completion at the State universities of Rhode Island, Maine, and Washington.

Core staffing requirements are complete for the Central Office and four of the five Regional Offices. While an integral part of the State-Federal fisheries management program, grant-in-aid programs, which include the Commercial Fisheries Research and Development Act, the Anadromous Fish Act, and the Jellyfish Act are administered separately. It is probable that the Office of State-Federal Relationships will also be responsible for administering grants-in-aid for marine mammal research, management, and enforcement.

Major accomplishments for 1972 include:

1. Initiation of a State-Federal management program for the American lobster. A technical group consisting of biologists and economists from the 11 coastal States (from Maine through North Carolina) and the Federal Government considered various management proposals for the American lobster in early August. Later in the month a policy group consisting of the respective State fisheries directors and the NMFS Regional Director (FNE) unanimously accepted 10 of the 12 proposals adopted by the technical committee. Meetings are now being held between State and industry representatives to discuss the proposals.

2. Several technical meetings were held by the Pacific Marine Fisheries Commission to consider comprehensive management for the Dungeness crab among the States of Washington, Oregon, and California. A policy group consisting of representatives from the three States and the Federal Government has been formed.
3. A program development plan for the State-Federal management program is being prepared under contract by the Riverside Research Institute (RRI). Extensive Federal, State, and industry contacts were made by RRI and State-Federal personnel to assure that viewpoints of persons and organizations affected by the State-Federal fisheries management program are incorporated in basic policy guidelines.
4. Numerous projects were completed under Federal grant-in-aid programs in 1972, including completion of the Glenn-Colusa fish screen in California, restoration of hurricane damaged oyster resources in Alabama, and a molluscan shellfish film in which nine States participated.
5. Legislation was passed which extends the Commercial Fisheries Research and Development Act of 1964 (Public Law 88-309, as amended) for 5 years beginning July 1, 1973.

Pribilof Islands Management Program

The Fur Seal Act of 1966 (80 Stat. 1091) charges the Secretary of Commerce with the management of the northern fur seal. Each summer the National Marine Fisheries Service supervises the harvest of an average of 50,000 fur seals on the Pribilof Islands, Alaska.

Research and management of the herd is conducted through terms of the Interim Convention on Conservation of North Pacific Fur Seals with the Governments of Canada, Japan, the Union of Soviet Socialist Republics, and the United States participating. The objective is to achieve maximum sustainable productivity of the resource. Under international protection and rational management the Alaska fur seal herd has increased from the low point of about 200,000 animals in 1912 to its present level of 1.3 million animals.

In addition to his responsibilities for management of the fur seal herd the Secretary of Commerce also is responsible for the well-being of 600 native Aleuts residing on the Islands of St. Paul and St. George. Cooperative endeavor with a variety of State and Federal agencies is resulting in progressive self-sufficiency by the native Aleut residents of the Pribilof Islands.

Increasing public concern with ecological and environmental issues has resulted in mounting concern with the annual harvest. Special emphasis has been given to the method of harvest. During 1972, NMFS

contracted with the Battelle Institute to test alternate methods of dispatching seals. Three personnel from this Institute tested five different devices which turned out to be ineffective primarily because of the seal's avoidance ability. The American Humane Association also sent a representative to the Islands to test a device which they had developed. This method likewise proved ineffective and slow compared to the conventional method.

Columbia River Fisheries Program

Progress was made during the year in two areas: (1) protection and improvement of the environment for estuarine and anadromous fish; and (2) Columbia River Fisheries Development Program.

Environmental protection and improvement was undertaken by cooperating with other agencies and groups in regional planning for future resource uses, advising prospective resource users how adverse effects of their proposals on stocks of fish may be avoided or minimized, and suggesting means by which damage to fisheries can be repaired.

The major planning effort in 1972 was participation in the Comprehensive Joint Plan for the Pacific Northwest. This is a multi-agency activity under the guidance of the Pacific Northwest River Basin Commission. The plan will provide elements of the Western U.S. Water Plan. We have provided fishery expertise to the Washington and Idaho Study Team and are the lead agency for fisheries in Oregon. The Regional Director serves as the Department of Commerce representative on this Commission and as the representative for the Western U.S. Water Plan Study. Single purpose plans for fisheries were developed cooperatively with the State fishery agencies and the Bureau of Reclamation for the White Salmon River, Wash., and the Deschutes and White Rivers, Oreg. These plans are aimed at development of fishery resources for sport and commercial fishermen.

Environmental damage has been prevented by advice contained in comments on Environmental Impact Statements, Dredge and Fill Permits, Waste Discharge Permits, permits for construction in navigable waters, Federal Power Commission licenses, and by providing functional designs for fish protective facilities at new water use projects. The latter includes plans or consultation for a new fish barrier dam at the Little White Salmon Hatchery, facilities at Scoggins Creek Dam, facilities for a new powerhouse at Bonneville Dam, facilities at Rock Island Dam, and Willamette Falls fishways—all in the Columbia Basin. Consultation and functional engineering plans have also been provided for fish passage or protective facilities throughout the nation (Peripheral Canal, Tehama-Colusa, and Marble Bluff in California; Charles River in Massachusetts, and Chena River in Alaska, are examples).

Repair of environmental damage will be advanced through advice provided for corrective measures at projects in the Columbia River Basin as well as in California (Keswick Dam ladder on the Sacramento River), Washington (Chittenden Locks on Lake Union), and Oregon (Savage Rapids screens and ladders on the Rogue River). A report was completed and submitted to the Corps of Engineers (jointly with BSF&W) recommending measures to replace fish lost through construction of four dams on the Snake River. The report recommends hatchery construction to replace loss of fish and acquisition of streambank to replace lost sport fishing opportunities.

In 1972, the salmon runs of the Columbia River continued to respond favorably to the NMFS-sponsored program to restore and enhance the anadromous fish runs, which were adversely affected by Columbia Basin water projects. The total annual production of salmon in the Columbia River is climbing ever closer to the estimated historical production of 50 million pounds. In 1972, the total annual production increased to 32 million pounds. Spring chinook runs were excellent and steelhead runs were also good, but fall chinook and coho runs were down. Hatchery propagation of salmon continues to play a major part in the increased returns. Current research and development directed toward economy of scale of hatcheries and computerized hatchery operational models, shows promise in further increasing operational efficiency of hatchery programs. The new Willamette Falls fishway was beneficial to passage of fish runs, even though entry into the ladder was difficult, if not impossible, during the heavy spring runoff. Proposed alterations to the project should prevent the same problem recurring with high waters in the future. Runs of fall chinook and coho salmon that were scarcely present in the Willamette River until a few years ago were created by introduction of fish above the falls and provision of the new ladder to allow them to pass upstream. In 1972, there were nearly 12,000 fall chinook and more than 17,000 coho salmon counted past Willamette Falls.

Progress was made in evaluation of the economic efficiency of the program. Analysis during 1972 of the combined returns of coho salmon to program hatcheries in 1968 and 1969 showed a contribution of 2,220,000 coho salmon for these years combined, and a benefit-cost ratio of 7.2:1. Operation by contract with State agencies of 88 fish ladders and over 500 screens to protect young fish was continued.

Marine Mammal Conservation

The Marine Mammal Conservation Program resulted from the enactment of Public Law 92-522, the Marine Mammal Protection Act of 1972. The provisions of the Act became effective 60 days after enactment on

December 21, 1972. Major tasks and supporting functions include (1) management or administration of the provisions of the Act, (2) establishment of public hearings procedures through use of hearing examiners, (3) Federal enforcement and monitoring of State enforcement activities, and (4) participation by coastal States through contract arrangements for enforcement functions related to marine mammal conservation and protection.

The Marine Mammal Protection Act of 1972 is administered jointly by the Department of Commerce, which has responsibility for all Cetaceans (whales, porpoises and dolphins) and Pinnipeds (seals and sea lions exclusive of walrus) and the Department of the Interior, which has responsibility for walruses, polar bears, sea otters, and manatees.

The Act established a moratorium on the taking and importation of marine mammals and marine mammal products except that under certain conditions a permit may be issued by the Secretary after it is first reviewed by the Marine Mammal Commission and the Committee of Scientific Advisors on Marine Mammals established by the Act. In addition to review by the Commission and its Committee, notice of all permit applications must be published in the *Federal Register* inviting public comment. When applicable, a public hearing may be held and depending on the outcome of the hearing a judicial review may be required.

The Act requires the Secretary, through the Secretary of State, to initiate and develop a variety of bilateral and multilateral agreements with other nations for the protection and conservation of marine mammals as well as to prepare reports to the Congress on results of these efforts.

The Act authorizes the Secretary to make grants, or to provide financial assistance to any Federal or State agency, public or private institution, or other person for the purpose of assisting such agency, institution or person to undertake research in subjects which are relevant to the protection and conservation of marine mammals. Additionally, the Secretary is authorized to make grants to each State whose laws and regulations relating to protection and management are found to be consistent with the purposes and policies of the Act.

PUBLICATIONS

NMFS staff members publish their work both in series of publications bearing the NMFS imprimatur and in scholarly journals and technical publications. A list, arranged by author, of these publications in calendar year 1972 comprises 387 titles.

The series issued directly under the auspices of NMFS in calendar year 1972 were:

Commercial Fisheries Abstracts

Issued monthly, *Commercial Fisheries Abstracts* has appeared since 1948. In calendar year 1972 the 12 numbers contained 384 pages. The publication is available from the Superintendent of Documents.

Marine Fisheries Review

In calendar year 1972, *Marine Fisheries Review* (until the July-August number called *Commercial Fisheries Review)* had 12 numbers (429 pages). The publication is available from the Superintendent of Documents.

Current Fisheries Statistics

These publications are issued monthly, quarterly, or annually by States, regions, or larger areas. In calendar year 1972, 36 annuals (526 pages) were issued; 252 monthlies (1,222 pages).

Data Report

The *Data Reports* appear in microfiche form. They are available as microfiches or as hard copies from the U.S. Department of Commerce, National Technical Information Service. Prices vary according to length. In calendar year 1972, 5 Data Reports (923 pages; 17 microfiches) were issued.

Fishery Bulletin

This publication, which originated in 1881 is issued quarterly. It is available from the Superintendent of Documents.

Four numbers of Volume 70 were issued in calendar year 1971. They contained 91 papers and an index, which totaled 1,330 pages.

Fishery Facts

This series was established in 1971. In calendar year 1972, 4 numbers (77 pages) were issued.

Fishery Market Development Series

This series contains popular educational publications on care, preparation, purchase, and nutrition of fishery products. They are for sale by the Superintendent of Documents. During calendar year 1972, one chart of marine fishes was issued.

Market News

The several Market News offices issue current statistical information on a daily, monthly, and annual basis. In calendar year 1972, the daily reports numbered 1,638 (5,000 pages); the monthly reports numbered 50 (375 pages); the annual reports numbered 6 (102 pages).

NOAA Technical Memorandum NMFS

This series was established in calendar year 1971. In 1972, 6 numbers (109 pages) were issued.

NOAA Technical Report NMFS CIRC

In July, 1971, the *Circular* series of NMFS (and formerly of the Bureau of Commercial Fisheries) was incorporated in the *NOAA Technical Report* series. Sequential numbering in the *Circular* series was unchanged. At the same time, the publications were put on sale by the

Superintendent of Documents. In calendar year 1972, 10 *Circulars* (610 pages) were issued.

NOAA Technical Report NMFS SSRF

In July, 1971, the *Special Scientific Report—Fisheries* of NMFS (and formerly of the Bureau of Commercial Fisheries) was incorporated in the *NOAA Technical Report* series. Sequential numbering in the *SSRF* series was unchanged. At the same time, the publications were put on sale by the Superintendent of Documents. In calendar year 1972, 17 SSRF's (450 pages) were issued.

Situation and Outlook

There are three types of *Situation* and *Outlook reports*, in which prices, production, imports, exports, and inventories of fishery products are analyzed. They are *Food Fish Situation and Outlook* (2 numbers, 128 pages in calendar year 1972); *Shellfish Situation and Outlook* (2 numbers, 136 pages in calendar year 1972); and *Industrial Fish Situation and Outlook* (2 numbers, 63 pages in calendar year 1972).

Statistical Digest

These are annual compilations of statistics with detailed tabulations relating to fishery production, manufacture, and commerce. In calendar year 1972, 1 (474 pages) was issued.

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